Dec. 30, 1952 P. E. FISCHLER 2,623,964

TUNED AUDIO RELAY

Filed May 3, 1948

FIG. 1

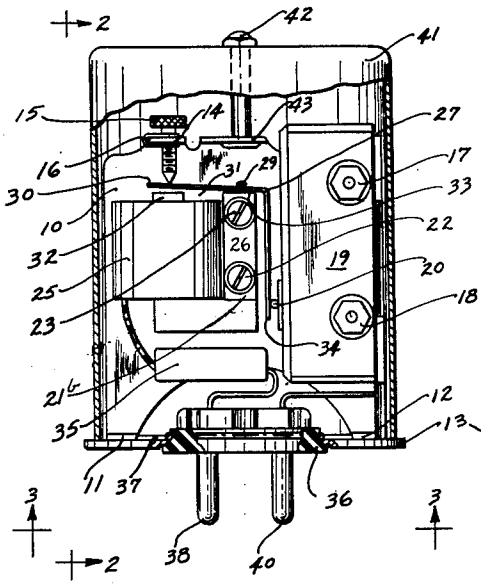


FIG. 2

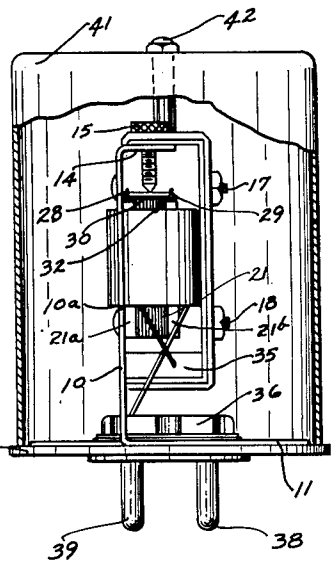


FIG. 3

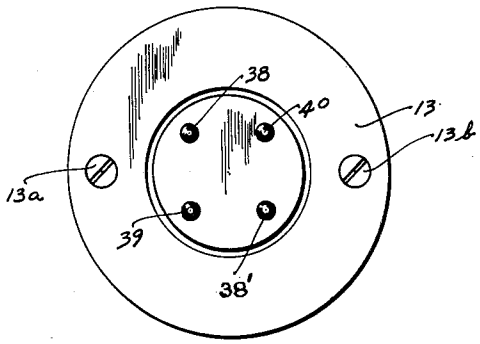


FIG. 4

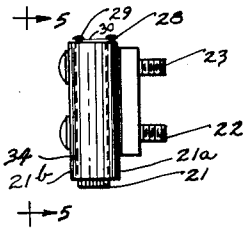


FIG. 5

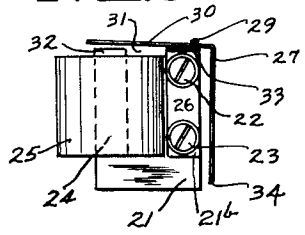
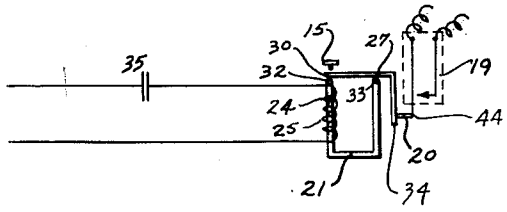


FIG. 6



INVENTOR.
PAUL E. FISCHLER

BY

ATTORNEY

Patented Dec. 30, 1952 2,623,964

UNITED STATES PATENT OFFICE

2,623,964

TUNED AUDIO RELAY

Paul E. Fischler, Buffalo, N. Y., assignor to Technical Alliance, Inc., a corporation of New York

Application May 3, 1948, Serial No. 24,780

3 Claims. (Cl. 200—87)

1

This invention relates to relays and more particularly to tuned audio relays although some of the features herein disclosed may be employed to advantage in relays of other types.

An object of the invention is to provide a relay that will have a fixed inductance value when in a series or parallel resonant circuit.

Another object of the invention is to provide an improved core and armature construction wherein a soft armature construction is mounted directly upon one of the pole-pieces of a core to span a flux gap in the core and is arranged to be attracted to said core by magnetic flux that occurs across said gap when the winding on said core is energized in a resonant circuit.

Another object of the invention is to provide a control mechanism associated with a tuned relay device in which a spring member of the switch mechanism is utilized in the adjustment of the armature of the relay.

A further object is to provide a relay of the type described of high sensitivity but which is easily adjusted, compact and efficient, and which is easy and economical to construct.

Further objects and advantages will be apparent from the following description of a preferred embodiment of the invention. It will be understood, however, that what is here shown is merely by way of illustration and that changes can be made in the construction and arrangement of the parts as herein shown and described, the invention being defined by the appended claims.

In the accompanying drawings:

Figure 1 is a side elevational view (with cover broken away) of a relay embodying the invention;

Figure 2 is an end view (with cover broken away) of the relay shown in Figure 1;

Figure 3 is a bottom view of the relay, Figures 1 and 2;

Figure 4 is an end view of the core and armature of the electromagnet shown in Figures 1 and 2;

Figure 5 is a side view of the core, Figure 4; and

Figure 6 is a diagram showing the relay of the preceding figures connected in a resonant circuit.

Referring to the drawings, the numeral 10 denotes a support which may be a stamping having a foot or feet 11, 12 by which it may be secured to the base 13 by screws 13*a*, 13*b*. The support has an inwardly turned ear 14 which is threaded to receive an armature adjusting

2

screw 15 which is locked to the ear in any suitable manner as by lock-nut 16.

On the right hand side (Figure 1) of the support is mounted in any manner such as by the screws 17, 18, a switch of any suitable type having any desired arrangement of contacts. Such a switch is generally indicated by the numeral 19 and has an outwardly extending actuating member 20 to be engaged by the relay armature 27 as presently described.

The switch 19 is merely illustrative of any spring-biased device operable to open or close contacts, or to switch electrical circuits in any manner; or this device may be a Sylphon bellows or other pressure-varying or pressure-responsive device adapted to control a valve or the like. As control devices are of numerous well-known types, same are not herein described in detail as obviously any spring-biased device can be used depending on the function desired.

A U-shaped magnet core is made up of a plurality of laminations 21 and side plates 21*a*, 21*b* of non-magnetic material secured together by screws 22, 23 which also serve to secure the core to support 10.

On one leg 24 of the core is placed the coil 25 which projects through a suitable opening 10*a* in the support and on leg 26 is mounted the rockable armature 27.

Armature 27 is L-shaped as shown and is rockably held in position by pins 28, 29 which pass through holes in the armature (the holes are slightly larger than the pins) and are a drive fit into the upper ends of the side plates 21*a*, 21*b*. The armature is thus supported and its lower side is in contact with the upper end of leg 26 forming one of the pole pieces of the core.

One leg 30 of armature 27 overlies the flux gap 31 between the poles 32, 33 of the core and the other leg 34 of the armature is laterally spaced apart from and lies parallel to the outer face of the leg 26 of the core.

A condenser 35 is positioned below the coil 25 and is connected in circuit with same in any suitable manner.

An insulating terminal block 36 is secured in base 13 by any suitable means such as the ring-lock 37 and carries terminals 38, 38', 39, 40 for the relay and switch.

A cover 41 is provided which, together with base 13 forms a casing enclosing all parts of the device. The cover is held in place by bolt 42 which threadedly engages the inwardly turned ear 43 on support 10.

One of the circuits with which the relay may be used is shown in Figure 6. This may be a series resonant circuit in which coil 25 and condenser 35 are connected as shown. The inductance and capacity of this circuit are kept at such relation as to provide the greatest flux at gap 31 at any given audio frequency. To obtain this maximum flux the characteristics of the lamination material of core 21 may be changed to maintain the circuit "Q" at the highest possible value.

The sizes of wire and number of turns on coil 25 and the thickness and area of core 21 are computed by known methods so that the electromagnet assembly, Figures 4 and 5, has a fixed inductance of such value that, when used in the circuit of Figure 6 or any other circuit having the desired characteristics and proper capacity, the total circuit will be brought into electrical resonance.

The armature 27 is so proportioned that its inertia, combined with the tension provided by its resiliency when adjusted by screw 15 and by further reason of the force applied to it by spring 44 in the switch, will not be attracted by pole pieces 32, 33 until maximum flux occurs across gap 31.

Maximum magnetic flux will only occur when the frequency of the energizing current is the resonant frequency of the circuit formed by the coil-core-condenser assembly. Therefore, as the coil-core assembly has a fixed inductance value, the relay can be tuned by changing the capacity of condenser 35 to cause maximum flux across gap 31 at any desired frequency from 40 to 10,000 cycles per second.

Where maximum flux occurs, the armature 27 is attracted and will remain in the attracted position to operate the contacts of switch 19 as long as energizing circuit current of resonant frequency flows in the coil-core-condenser circuit.

Armature 27 will not vibrate, as it is damped by its own resiliency and that of spring 43.

What is claimed is:

1. In a tuned relay, a winding, a U-shaped core comprising a plurality of laminations, said winding being mounted on one leg of said core, the free ends of said core extending outwardly beyond the end of said winding, means extending transversely of the exposed leg of said core for securing said laminations together, an L-shaped armature, one leg of which extends across the free ends of said core, the other leg of same extending along the exposed side of said core toward the closed end thereof, means for movably securing said armature to one end of said core in rockable relationship thereto and a control device means located adjacent said armature to be actuated thereby, and means mounted independently of said core for adjusting said armature relative to said core.

2. The relay as claimed in claim 1 wherein said means for movably securing the armature to the core comprises pins extending through apertures in the armature and into said core whereby same is rockably supported thereon and in direct metallic contact therewith.

3. In a tuned audio relay, a plate-like support, an alternating current electromagnet secured to said support comprising a U-shaped core secured to the flat side of said support and having a winding on one of its legs, said winding being of fixed inductance value, the free ends of said core forming pole pieces extending outwardly from said winding and forming a flux gap, an L-shaped armature rockably mounted on one of said pole pieces and having a portion adapted to span said flux gap and to extend over at least a part of the opposed end of the remaining pole piece, adjusting means adjacent said armature adapted to contact one end thereof to adjust same where it overlies said flux gap and thereby vary the distance of said portion from its underlying pole piece, and a control device on said support engaged by said armature for operation thereby.

PAUL E. FISCHLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
753,918	Rorty	Mar. 8, 1904
821,992	Downs	May 29, 1906
928,360	Clement	July 20, 1909
1,174,230	Coleman	Mar. 7, 1916
1,272,402	Egerton	July 16, 1918
1,377,573	Fortesque	May 10, 1921
1,576,155	Stevens	Mar. 9, 1926
1,895,355	Traver	Jan. 24, 1933
1,895,357	Warrington	Jan. 24, 1933
1,970,333	Meuhter	Aug. 14, 1934
1,997,655	Sandford	Apr. 16, 1935
2,050,665	Mathews	Aug. 11, 1936
2,392,981	Fischler	Jan. 15, 1946
2,394,786	Korneke	Feb. 12, 1946
2,404,982	Owens	July 30, 1946
2,423,524	Side	July 8, 1947

FOREIGN PATENTS

Number	Country	Date
769,391	France	Aug. 24, 1934
468,974	Great Britain	July 16, 1937